

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In the Application of:

ADRIAN LUNGU

APPLICATION NO.: 09/839,803

FILED: APRIL 20, 2001

CONFIRMATION NO.: 2560



CASE NO.: IM1303 US NA

GROUP ART UNIT: 1752

EXAMINER: JOHN S. CHU

FOR: A PHOTOPOLYMERIZABLE ELEMENT FOR USE AS A
FLEXOGRAPHIC PRINTING PLATE AND A PROCESS
FOR PREPARING THE PLATE FROM THE ELEMENT

Commissioner of Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Sir:

Declaration Pursuant to 37 CFR §1.131

I, Adrian Lungu, am a citizen of Romania, residing at 623 Marlboro Road, Old Bridge, New Jersey, United States of America, and I declare as follows:

1. I received a Bachelor of Science degree in Chemical Engineering from Iasi Polytechnic Institute in Iasi, Romania, a Master of Science degree in Macromolecular Science from the Iasi Polytechnic Institute in Iasi, Romania, and a Ph.D. in Photochemical Sciences from the Bowling Green State University in Bowling Green, OH. I have been employed at the Parlin, New Jersey Research & Development Laboratory of E. I. du Pont de Nemours and Company since August 1997, and currently hold the position of Senior Research Chemist which I attained in August 1999. A listing of my publications and patents are set forth in Attachment 1.

2. I am the inventor of the subject matter claimed in the above-identified application. I have reviewed the Office Action dated June 22, 2004. I am aware that this declaration is being submitted to show completion in this country of the claimed invention prior to February 22, 2001.

3. Prior to February 2001, I conceived and reduced to practice the present invention of a photopolymerizable element and a process for making a printing plate from this element.

4. On or about January 29, 2000 in the Parlin, New Jersey laboratory, a technician under my supervision prepared a photosensitive element as follows:

A photosensitive element was prepared containing a photopolymerizable layer that had at least one monomer, a radical photoinitiator, an onium salt, and a leuco dye. The monomer used was 1,6-hexanediol diacrylate (HMDA). The photoinitiator used was Irgacure® 651 from Ciba which is 2,2-dimethoxy-2-phenylacetophenone. The onium salt used was UVI6974 from Union Carbide, which is a sulfonium hexafluoroantimonate Lewis acid. The leuco dye used was Pergascript Blue from Ciba. The photopolymerizable layer had other additives including an elastomeric binder (Kraton® 1102, a poly(styrene-butadiene-styrene) block copolymer); a plasticizer (Huls/Polyoil, a polybutadiene oil); an antioxidant (BHT, 2, 6 – dimethyl-4-t-butyl phenol), a radical scavenger for thermally-produced radicals (CGL 305, a nitrogen heterocyclic compound from Ciba); a thermal inhibitor (TAOBN, which is 1,4,4,-Trimethyl-2,3,-diazabicyclo-[3.3.2]- non-2-ene-2,3-dioxide); a high temperature radical scavenger (CGI-MX a nitrogen heterocyclic compound from Ciba); and an inert dye, Zapon Red. The components for the photopolymerizable layer were mixed and extruded in a lab extruder between a support and a coversheet having a polyamide release layer to form the photosensitive element. The support used was polyethylene terephthalate. The total thickness of the element was 67 mils. The color of the photopolymerizable layer was pink-red.

The specific experimental example used in preparing the photosensitive element is described in my Laboratory Notebook E93364, page 104, dated January 29, 2000, a copy of which is attached hereto. The photosensitive element described above is identified in my notebook as the plate formulation where the percentage of each component is based upon the total weight of the layer.

5. On or about January 29, 2000 in the Parlin, New Jersey laboratory, a technician directly under my supervision carried out a process to make a flexographic printing plate from the prepared photosensitive element. The process included exposing and treating steps as follows:

The photosensitive element was backflash exposed to actinic radiation to form a floor by placing the element on a CYREL® 2001 exposure unit with the support side facing the lamps, and was overall exposed to ultraviolet radiation of 360-365 nm for 0.5 minutes (0.6 Joules/cm²). No change in color was observed in the photopolymerizable layer, as it remained pink-red color.

The photosensitive element was imagewise exposed to actinic radiation to form polymerized portions and unpolymerized portions in the photopolymerizable layer. The coversheet was removed from the backflushed photosensitive element, and an image-bearing mask film was placed on a surface of the element opposite the support, and a vacuum was drawn. The element was exposed to UV light having a wavelength of 360-365 nm through the mask for 10 minutes (12 Joules/cm²) on the exposure unit. A change in color was observed between the exposed areas (polymerized portions) and the unexposed areas (unpolymerized portions) of the photopolymerizable layer. The polymerized portions were blue which contrasted with the unpolymerized portions that were pink-red.

The exposed printing element was treated to remove the unpolymerized portions in the layer and form a relief surface having raised areas. The element was developed in organic solvent, CYREL® OPTISOL® washout solution for 480 seconds in a CYREL® 1002 type processor to remove the unexposed areas and form a relief printing plate. The resulting printing plate exhibited a difference in color between the raised areas of the relief surface and the floor. The raised areas were blue and contrasted with the floor color of pink-red.

The plate was dried for 2 hours in a convection oven. The plate was further exposed to UV light having wavelength of 254 nm on the exposure unit for 7 minutes to eliminate any residual tackiness by light finishing. At the same time as the light finishing exposure, the plate was also uniformly exposed to UV light of 360-365 nm for 2 minutes (i.e., post-exposure), to complete photopolymerization. The contrast between the raised image areas and the floor areas remained unchanged.

6. I declare further that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true, and further that these statements are made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States code and that such willful false statements may jeopardize the validity of the application or any patent issuing thereon.

11/30/2004
Date

Adrian Lungu

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United States of America

Attachment 1
ADRIAN LUNGU

PATENTS

“Photosensitive Intramolecular Electron Transfer Compounds”; Neckers, D.C.; Hassoon, S. A.; Sarker, A. M.; Lungu, A.; Mejiritski, A., issued as U.S. Patent 5,998,496 on December 7, 1999.

“Process For Making A Flexographic Printing Plate And A Photosensitive Element For Use In The Process”; Fan, R. N., Hackler, M. A., Kannurpatti, A. R., Lungu, A., Taylor B. K.; issued as U.S. Patent 6,773,859 B2 on August 10, 2004.

SCIENTIFIC PUBLICATIONS

“Application of the Rheological Models for the Descriptions of the Flow Characteristics of Some Polymeric Systems”; Petrovan, S., Rusu, M.; Lungu, A.; Apetroaie, A. *Acta Polymerica*, **1992**, 43, 214.

“Study of the Intrinsic Properties of Viscous Flow in the Water - 1,4 Dioxane Solutions”; Ionescu, Ghe.; Lungu, A.; Rosca, D. *Canadian Bulletin of Chemistry*, **1992**, 3, 87.

“Solution and Solid C13 NMR Studies of Multifunctional Polyacrylate Networks”; Lungu, A.; Neckers, D.C. *Journal of Coatings Technology*, **1995**, 850, 29.

“CPMAS C13 NMR Study of the Homogeneity of Some Photopolymerized Acrylic Networks”; Lungu, A.; Neckers, D.C. *Macromolecules*, **1995**, 28, 8147.

“Analytical Methodology for Polyacrylate Networks”, Jager, W.F.; Lungu, A.; Popielarz, R.; Neckers, D.C. *Polym. Mat. Sci. & Eng.*, (ACS div. of polym.mater.), **1996**, 74 (1), 352.

“Correlation between the Mechanical Properties and the Homogeneity of Some Photopolymerized Acrylic/Methacrylic Networks”; Lungu, A.; Neckers, D.C. *J. Polym. Sci. Polym. Chem. Ed.*, **1996**, 34, 3355.

“Synthesis and Characterization of Novel Polymeric Systems Bearing Benzophenone Borate Salt as New Photoinitiators for UV Curing”; Sarker, A.M.; Lungu, A.; Neckers, D.C. *Macromolecules*, **1996**, 29, 8047.

“Photopolymerization of Polyfunctional Acrylates and Methacrylates Mixtures. Characterization of Polymeric Networks by Fluorescence Spectroscopy and Solid-State NMR”; Jager, W.F.; Lungu, A.; Neckers, D.C. *Macromolecules* **1997**, 30, 780.

“Photoreactive Monomers and Catalysts for Desktop Manufacturing”; Neckers, D.C.; Fry, B.; Guo, A.; Lungu, A.; Mejiritski, A.; Lungu, V.; Marino, T. *Imaging Science and Technology*, 50th Annual Conf. Proceedings, May 1997.

“Solid State Studies on the Effect of Fillers on the Mechanical Behavior of Photocured Composites”; Lungu, A.; Mejiritski, A.; Neckers, D.C. *Polymer* **1998**, *39*, 4757.

“Tetraorganylborate Complexes as Convenient Precursors for Photogeneration of Tertiary Amines”; Sarker, A.M.; Lungu, A.; Mejiritski, A.; Kaneko, Y.; Neckers, D.C. *J. Chem. Soc., Perkin Trans. 2*, **1998**, *10*, 2315.

TITLE

Color Formation

DATE

01/19/2000

E 93364-104

PURPOSE

HOS

Since the last lab. extender plates didn't give us too much of a contrast, we made a new formulation to be tried.

Now instead of CVL I'll be using Pergascript Blue from Ciba. I also increased the amount of the dye and of the acid generator.

The plate formulation

is:

K 1102 59%

Hals/Polyoil 28%

HMDA 9%

Irg. 651 2.5%

BHT 1%

UVI 6974 0.25%

Pergascript Blue 0.15%

CGL 305 0.05%

TAOBN 0.05%

CGI MX 0.05%

Make the following mixture:

HMDA	692.5 g
Irg. 651	192.5 g
BHT	77 g
UVI6974	16.5 g
Pergascript	12.5 g
CGL305	3 g
TAOBN	3 g
CGI MX	3 g
Total	1000 g

Stir overnight in the DARK.

Monomer composition in % can be determined by dividing the numbers at left by 100. CGL 305 is a residual monomer from the thermally produced ones.

EXPERIMENTER

Shawn

DATE

01/19/2000

WITNESSED BY

John D.

DATE

4/27/00